1. Find the solution of the following ODEs: (5 pts. each)

(a) $y' = te^t$
(b) $ty' + 2y = t^2 - t + 1, \ y(1) = 1/2$
(c) $y' = \sec y$
(d) $y' = \frac{y^2 - 1}{yt}, \ y_0 \neq \pm 1$
(e) $y' = \frac{y^2 - 1}{yt}, \ y_0 = 1$
(f) $(e^t \sin y - 2y \sin t) + (e^t \cos y + 2 \cos t)y' = 0$
(g) $(3t^2y + 2ty + y^3) + (t^2 + y^2)y' = 0$
(h) $y' = \frac{2y t}{t^2 - 3y^2}$

2. Let $f$ be continuous on $[a, b]$ with $f \neq 0$ on $[a, b]$. Define $F(s) = \int_a^s \frac{1}{f(z)} \, dz$. Show that $F$ is well-defined, continuous and differentiable on $(a, b)$. Express the solution of $y' = f(y)$ in terms of $F$. 

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